FREE STARTER

GRADES 3–5

Is That Reasonable? Estimation & Reasonableness, Grades 3–5

6 complete activities from Estimation & Reasonableness, each with a worked answer.

About
350

Exact?
Check it.

HOW TO USE

1. Read the situation and the evidence first.
2. Show your thinking in the work boxes, not only an answer.
3. Explain how you know your answer makes sense.
4. Try the new problem at the bottom of the page.

6 activities • 3 answer pages • From the 24-activity collection

10 US Letter pages • Print at 100% / Actual Size

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

Number Line Neighbors

LEVEL 1 ●○○

Use the number lines to decide which multiple is closer. Estimate before you compute.

Two classes counted the books on their shelves. Room 12 has 347 books. Room 14 has 228 books. On number line A, the tick marks go from 340 to 350. On number line B, they go from 220 to 230. Place each number and circle the closer ten. Then think about hundreds: is 347 closer to 300 or 400? Is 228 closer to 200 or 300? Use the rounded tens to estimate how many books the two rooms have together.

NUMBER LINE A

NUMBER LINE B

EVIDENCE TO USE

- Room 12: 347 books
- Room 14: 228 books
- Number line A: 340 to 350
- Number line B: 220 to 230
- Page rule: a number exactly halfway rounds up

1. Mark 347 and 228 on the number lines and circle the closer ten for each.

2. Round each number to the nearest hundred and tell how you know.

3. Add the rounded tens to estimate the total, then find the exact total.

TRY IT • Round 462 and 315 to the nearest hundred and estimate their sum. Then find the exact sum.

Name _____ Date _____

Friendly Partners

LEVEL 1 ●○○

Write each number inside its closest friendly partner card. Add the partners in your head.

Ms. Rivera's class collected cans for a recycling contest. They collected 248 cans in Week 1, 497 cans in Week 2, and 153 cans in Week 3. The partner cards on the page show 150, 200, 250, 450, 500, and 550. Write each week's count inside the partner card that is closest and easy to add. Use the partners to estimate the three-week total in your head. Then decide: did the class pass its goal of 850 cans?

PARTNER CARDS

150	200	250	450	500	550

EVIDENCE TO USE

- Week 1: 248 cans
- Week 2: 497 cans
- Week 3: 153 cans
- Partner cards: 150, 200, 250, 450, 500, 550
- Class goal: 850 cans

1. Write each week's count inside its closest partner card.

2. Add the partners mentally and write the estimate.

3. Decide whether the class passed 850 cans and explain using your estimate.

TRY IT • Estimate 302 + 446 using friendly partners, then find the exact sum.

Name _____ Date _____

Rounding Ladder

LEVEL 2 ●●○

Round one number to many places. Choose the rounding that fits the purpose.

A county fair reported 386,472 visitors this year. Climb the rounding ladder: round 386,472 to the nearest ten, hundred, thousand, ten thousand, and hundred thousand. Then help the poster team choose a rounding.
Poster rule 1: The number has at most two nonzero digits, so it is easy to read.
Poster rule 2: It is within 5,000 of the real count.
Poster rule 3: The poster will say 'nearly ___ visitors,' so the rounded number must be greater than the real count.

ROUNDING LADDER FOR 386,472

Nearest	Rounded	Rule 1	Rule 2	Rule 3
ten				
hundred				
thousand				
ten thousand				
hundred thousand				

EVIDENCE TO USE

- Visitors: 386,472
- Places: ten, hundred, thousand, ten thousand, hundred thousand
- Rule 1: at most two nonzero digits
- Rule 2: within 5,000 of the real count
- Rule 3: greater than the real count

1. Fill in all five rungs of the rounding ladder.

2. Test each rounded number against the three poster rules.

3. Tell which rounding is most useful for the poster and why.

TRY IT • A stadium has 52,849 seats. Round this number to the nearest thousand and to the nearest ten thousand. Which would you use to tell a friend about how big the stadium is?

Name _____ Date _____

Front End First

LEVEL 2 ●●○

Add the front-end values, then adjust with the leftover parts.

The library tracked how many books were checked out each month: 3,418 in September, 2,756 in October, and 1,193 in November. Use front-end estimation.
Step 1: Add only the thousands.
Step 2: Look at the leftover parts (418, 756, 193) and group them into friendly amounts.
Step 3: Adjust your front-end total.
Compare your adjusted estimate with the front-end total alone. Then find the exact sum.

EVIDENCE TO USE

- September: 3,418 books
- October: 2,756 books
- November: 1,193 books
- Leftover parts: 418, 756, 193

1. Add the thousands to get the front-end total.

2. Group the leftover parts and write your adjusted estimate.

3. Find the exact total and tell how far off each estimate was.

TRY IT • Use front-end estimation with adjustment for 1,207 + 2,481 + 3,350 + 2,519. Then find the exact sum.

Name _____ Date _____

Decimal Benchmarks

LEVEL 3 ●●●

Estimate using whole numbers and using halves. Decide which benchmark fits better.

Three ribbons for a banner measure 2.46 m, 1.48 m, and 0.53 m. Estimate the total length two ways. First round each length to the nearest whole meter. Then round each length to the nearest half meter (0, 0.5, 1, 1.5, and so on). Find the exact total and decide which strategy was closer and why. Then use halves to estimate how much longer a 6.52 m ribbon is than a 2.47 m ribbon.

RIBBON LENGTHS (M): PLACE EACH RIBBON

EVIDENCE TO USE

- Ribbons: 2.46 m, 1.48 m, 0.53 m
- Benchmarks: whole meters or halves
- Difference item: 6.52 m and 2.47 m

1. Estimate the total by rounding to whole meters, then by rounding to halves.

2. Find the exact total and explain which estimate is closer.

3. Use halves to estimate 6.52 − 2.47 and check it exactly.

TRY IT • Estimate 3.47 + 0.52 + 1.96 using halves, then find the exact sum.

Name _____ Date _____

Decimal Point Detective

LEVEL 3 ●●●

Only the digits are shown. Use an estimate to place each decimal point.

A calculator screen lost its decimal points, so only the digits are showing. Use estimation to place the decimal point in each answer.
A) 3.8 × 4.2, digits 1596
B) 2.35 × 19, digits 4465
C) 46.8 ÷ 6, digits 78
D) 12.5 × 0.8, digits 100
Then check Jules's claim. Jules says 2.35 × 19 = 446.5. Is Jules's answer reasonable?

EVIDENCE TO USE

- A) 3.8 × 4.2 shows 1596
- B) 2.35 × 19 shows 4465
- C) 46.8 ÷ 6 shows 78
- D) 12.5 × 0.8 shows 100
- Jules: 2.35 × 19 = 446.5

1. Write a quick estimate for each problem.

2. Place the decimal point in each answer so it matches your estimate.

3. Decide whether Jules's answer is reasonable and explain.

TRY IT • The digits of 0.45 × 62 are 279. Place the decimal point and explain your estimate.

1. Number Line Neighbors

LEVEL 1

347 rounds to 350 to the nearest ten and to 300 to the nearest hundred. 228 rounds to 230 and to 200. Estimate: 350 + 230 = 580 books. The exact total is 575.

WORKED REASONING • 347 is 7 steps past 340 and 3 steps before 350, so it is closer to 350. On a hundreds line, 347 is below the halfway point of 350, so it rounds to 300. 228 is 2 steps from 230 and 8 steps from 220, so it rounds to 230. It is below 250, so it rounds to 200 to the nearest hundred. Estimate with tens: 350 + 230 = 580. Exact: 347 + 228 = 575. Both numbers were rounded up, so 580 is a small overestimate. That means 575 is reasonable.

WATCH FOR • Some students round 347 to 400. They may think the tens digit 4 looks big, or they may round in two steps (347 to 350, then 350 to 400). Rounding is done once, to the stated place, by finding the closer multiple.

TRANSFER • 462 is closer to 500, and 315 is closer to 300. Estimate: 500 + 300 = 800. The exact sum is 777, so 800 is a reasonable overestimate.

2. Friendly Partners

LEVEL 1

The partners are 250, 500, and 150. Estimate: 250 + 500 + 150 = 900 cans. The exact total is 898, so the class passed its goal of 850.

WORKED REASONING • 248 is 2 away from 250. 497 is 3 away from 500. 153 is 3 away from 150. These partners combine easily: 250 + 150 = 400, and 400 + 500 = 900. Two partners are a little high and one is a little low, so the estimate should be very close. Exact: 248 + 497 = 745, and 745 + 153 = 898. The estimate of 900 is only 2 more than 898. The estimate alone already settles it: the partners change the counts by only 2, 3 and 3 cans, so together they cannot move the total more than 8 away from 900. Even 900 - 8 = 892 is above 850, so the class passed its goal.

WATCH FOR • Students may always round to the nearest hundred (200 + 500 + 200). That happens to give 900 here, but it changes 248 by 48 and 153 by 47, and those changes only cancel by luck. Partners that sit closer, like 250 and 150, give an estimate you can trust.

TRANSFER • Partners: 300 + 450 = 750. The exact sum is 748, so the estimate is 2 too high.

9. Rounding Ladder

LEVEL 2

The ladder: 386,470; 386,500; 386,000; 390,000; 400,000. The poster should use the nearest ten thousand, 390,000.

WORKED REASONING • Nearest ten: the ones digit is 2, which is less than 5, so 386,470. Nearest hundred: 72 is past 50, so 386,500. Nearest thousand: 472 is below 500, so 386,000. Nearest ten thousand: 6,472 is past 5,000, so 390,000. Nearest hundred thousand: 86,472 is past 50,000, so 400,000. Rule 1 leaves 390,000 and 400,000. Rule 2: 390,000 is 3,528 away, but 400,000 is 13,528 away, which is too far. Rule 3: 390,000 is greater than 386,472. The nearest ten thousand fits every rule.

WATCH FOR • Students may think the most precise rounding (nearest ten) is always best. Precision has a cost: 386,470 is hard to read at a glance. The most useful place depends on the question being answered.

TRANSFER • The roundings are 53,000 and 50,000. Either can work. 50,000 is easiest to say, while 53,000 is closer (151 away instead of 2,849 away). A strong answer names the purpose.

10. Front End First

LEVEL 2

The front-end total is 6,000. The leftovers add to about 1,350 to 1,400, so an adjusted estimate is about 7,350 or 7,400. The exact total is 7,367. Errors: 6,000 is 1,367 too low; 7,350 is 17 too low; 7,400 is 33 too high.

WORKED REASONING • Thousands: 3,000 + 2,000 + 1,000 = 6,000. Leftovers: 756 is about 750, 418 is about 400, and 193 is about 200. 750 + 200 = 950, and adding 400 makes about 1,350. Some students will call that about 1,400. Adjusted estimate: 6,000 + 1,350 = 7,350, or about 7,400. Exact: 3,418 + 2,756 = 6,174, and 6,174 + 1,193 = 7,367. The front end alone, 6,000, is 1,367 too low because it ignores every hundreds part. An adjusted estimate of 7,350 is 17 too low, and 7,400 is 33 too high. These are examples: accept any sensible grouping of the leftovers and judge it by the reasoning.

WATCH FOR • Students may stop after the front end and report 6,000. A front-end total is at or below the exact sum; it is an underestimate whenever a nonzero leftover part is dropped, because each dropped part is counted as zero. The adjustment step is what makes this strategy accurate.

TRANSFER • The front end is 1,000 + 2,000 + 3,000 + 2,000 = 8,000. The leftovers (207, 481, 350, 519) are about 200 + 500 + 350 + 500 = 1,550. The adjusted estimate is about 9,550. The exact sum is 9,557.

17. Decimal Benchmarks

LEVEL 3

Whole-meter estimate: 2 + 1 + 1 = 4 m. Half-meter estimate: 2.5 + 1.5 + 0.5 = 4.5 m. The exact total is 4.47 m, so halves are closer. 6.52 - 2.47 is about 6.5 - 2.5 = 4 m, and the exact difference is 4.05 m.

WORKED REASONING • Nearest whole: 2.46 rounds to 2, 1.48 rounds to 1, and 0.53 rounds to 1, for a total of 4. Nearest half: 2.46 is 0.04 from 2.5, 1.48 is 0.02 from 1.5, and 0.53 is 0.03 from 0.5. The total is 2.5 + 1.5 + 0.5 = 4.5. Exact: 2.46 + 1.48 = 3.94, and 3.94 + 0.53 = 4.47. The whole-meter estimate is off by 0.47, because 2.46 and 1.48 each lost almost half a meter. The half-meter estimate is off by only 0.03, because each length sits right next to a half. Difference: 6.5 - 2.5 = 4, and the exact difference is 6.52 - 2.47 = 4.05.

WATCH FOR • Students may think rounding to whole numbers is the only way to estimate with decimals. When values cluster near .5, whole-number rounding moves each one almost half a unit, and those errors can build up. Halves fit these numbers much better.

TRANSFER • 3.5 + 0.5 + 2 = 6. The exact sum is 5.95, so the estimate is 0.05 too high.

18. Decimal Point Detective

LEVEL 3

A) 15.96, because 38 × 42 = 1,596. B) 44.65. C) 7.8. D) 10.0, or 10. Jules's 446.5 is not reasonable, because it is ten times too big.

WORKED REASONING • A) 4 × 4 = 16, so the answer is near 16: 15.96. The digits come from 38 × 42 = 1,596. B) 2.35 × 20 = 47, so the answer is in the 40s: 44.65. C) 48 ÷ 6 = 8, so the answer is near 8: 7.8. D) 0.8 is a little less than 1, so the product is a little less than 12.5. The answer is 10.0, not 1.00 or 100. Jules: 2 × 20 = 40, so 446.5 is about ten times too big. The decimal point is one place too far to the right.

WATCH FOR • Students may place the decimal point to copy a factor, such as writing 1.596 because 3.8 has one digit before its decimal point. The decimal point must make the answer close to the estimate. Since 4 × 4 = 16, the answer is 15.96.

TRANSFER • 0.45 is about 0.5, and 0.5 × 60 = 30. The answer must be near 30, so it is 27.9.